

REMARKS

By this amendment, claims 1-31 are pending in the application, of which claims 1, 3, 11, 18, 19 and 22 are being amended, and claims 25-31 are being withdrawn. The amendments are fully supported by the originally filed specification and original claims and add no new matter. Entry of the amendments and reconsideration of the present case is respectfully requested.

Applicant affirms the election of the claims of Group I as defined by the Examiner, namely claims 1-24, without traverse.

Claim 3 was objected to for improper dependency. Claim 3 is being amended to correct its dependency to claim 1.

Claim 9 was rejected under 35 USC 112, as indefinite, and is being amended to recite dependency upon claim 6, which has antecedent basis for an electrode lead.

Rejection Under 35 U.S.C. 103(a)

I. Claims 1-5, 7, 8, 11-15 and 17 were rejected under 35 USC 103(a) as being unpatentable over Chen et al (US 6,423,949) in view of Chang (US 5,916,370) or Berkman et al. (US 4,090,851), and Brown et al (US 6,046,758) or Todd (US 6,630,413).

Claims 1-5, 7 and 8

Claim 1 is to a substrate support for substrate processing chamber, the substrate support comprising (a) a ceramic block having a substrate receiving pocket that is sized to receive a substrate therein, a peripheral ledge extending about the substrate receiving pocket, and side surfaces; (b) a ceramic coating covering the

substrate pocket and peripheral ledge of the ceramic block, the ceramic coating comprising an amorphous Si-H-N-O compound; (c) a resistance heater in the ceramic block; and (d) heater leads extending out of the ceramic block to conduct electrical power to the resistance heater.

As acknowledged by the Examiner, the primary reference Chen et al. "does not show the claimed ceramic coating comprising an amorphous Si-H-N-O compound." In fact, not only does Chen et al. not disclose the claimed amorphous Si-H-N-O compound; but Chen et al. also provides no teaching to the application of a coating on a ceramic block. Chen et al., and simply describes the exposed surface of the susceptor as comprised of AlN (col. 7, lines 50-60) but does not teach or suggest the use of a coating for the susceptor. Thus, the teachings of Chen et al. would not motivate one of ordinary skill to find references that use a coating on a ceramic block having a resistance heater.

The Examiner continues remarking that Chang shows a ceramic support provided with a protective coating and Berkman teaches a protective coating of silicon nitride over ceramic support.

However, a teaching to a ceramic support provided with a protective coating, as shown in Chang, does not cure the deficiencies of Chen et al. to the absence of any coating motivation, and to the absence of the claimed amorphous Si-H-N-O compound. As explained, Chen et al. does not suggest use of a coating. Chang teaches that a different coating comprising a diamond film provides a protective function. However, neither Chen et al, nor Chang make any mention of the claimed amorphous Si-H-N-O compound. Because Chen et al, does not suggest a coating and Chang teaches a different coating than the one claimed, the rejection should be withdrawn.

Nor does Berkman's teachings to a protective coating of silicon nitride over a ceramic die crucible cure the deficiency of a lack of disclosure of the need for a

coating in Chen et al., and more specifically to the claimed amorphous Si-H-N-O compound on a substrate support for a substrate processing chamber. The art of forming die crucibles is non-analogous to the art of substrate supports for substrate processing chambers. Chen et al. does not motivate one to seek coating art. Berkman teaches coatings for an entirely different art than a substrate support for a substrate processing chambers. Thus Berkman does not cure the deficiencies of Chen et al. or Chang.

The Examiner continues to state that Brown shows an amorphous protective coating comprising Si-H-N-O compound used to produce a highly wear and abrasion resistant coating. The Examiner also states that Todd shows the amorphous silicon nitride material. The Examiner then suggests that it would be obvious to adapt Chen et al. with the teachings of Chang and Berkman to provide the ceramic block with a protective coating including silicon nitride, and further adapt the teachings and Brown and Todd with a coating comprising Si, H, H [sic - N] and O.

However, Brown et al. teaches wear resistant thermal print heads with silicon-doped diamond-like carbon protective coatings. (Abstract.) The thermal print head is used to print images in paper and related media. As amended, independent claims 1, 11 and 18, are to a substrate support for a substrate processing chamber. Thermal print head technology is non-analogous art to a substrate support for a substrate processing chamber. Furthermore, the print head does not have a substrate receiving pocket that is sized to receive a substrate. One of ordinary skill in the art would not be motivated to use a coating used to reduce wear in a thermal print head to reduce contamination from a substrate support for substrate processing chamber. Not only are the technical fields different, by the end application of reducing wear versus reducing contamination are also different. Thus, Brown et al., also does not cure the deficiency of Chen et al. which does not suggest the use of coatings.

The Examiner's further relies on Todd to show an amorphous silicon nitride material. However, Todd is a reference that generally teaches CVD synthesis of

silicon nitride materials containing a low hydrogen content by CVD. Todd further teaches that such silicon nitride phones are used to make micro electronic devices such as integrated circuits. (Column 2, lines 55-67.) Thus, Todd provides no teaching or motivation to apply an amorphous protective coating comprising Si-H-N-O compound to a substrate support for substrate processing chamber to reduce contamination of the substrate placed on the chamber as taught in the instant Specification. A teaching to a method of fabricating a type of coating is not a teaching to a component comprising a coating used for a particular application, as claimed. The reference should provide some motivation or teaching that would cause one of ordinary skill in the art to apply the coating methods taught by the reference, to the particular product being claimed. Thus, Todd et al also does not teach or suggest the instant claims.

Claims 11-15 and 17

Claim 11 is to a substrate support comprising a ceramic block having a substrate receiving pocket that is sized to receive a substrate therein, a peripheral ledge extending about the substrate receiving pocket, and side surfaces; a silicon nitride compound coating covering the substrate pocket and peripheral ledge of the block; a resistance heater in the block; and heater leads extending out of the block to conduct electrical power to the resistance heater.

Chen et al. teaches a multi-zone resistance heater, but does not teach the silicon nitride compound coating covering a substrate receiving pocket of the ceramic block which has a heater in the block. A teaching to a multi-zone heater is not a teaching to a ceramic coating comprising second nitride compound to reduce contamination arising from a substrate support as claimed. There is no teaching a suggestion in Chen et al. that a coating is desirable on the multi-zone heater. Nor does Chen et al. teach that a coating may be used to reduce contamination from a substrate support as disclosed in the present Specification. In addition, Chen et al. provides no mention of the claimed silicon nitride compound coating.

Chang does not support the deficiencies of Chen et al., because Chang also does not disclose a substrate support comprising a silicon nitride compound coating on a ceramic block. Instead Chang discloses a diamond coating on the body of a susceptor. Chang further teaches that the susceptor body is typically made of graphite, but can also be made of the material such as silicon nitride. By teaching that the susceptor itself is made from silicon nitride, Chang teaches against a ceramic block having a silicon nitride compound coating as claimed.

Furthermore, Chang does not teach a ceramic block that includes the resistance heater or heater leads extending out of the ceramic block to conduct electrical power to the resistance heater. Chang mentions an annular pre-heat ring made of silicon carbide coated with graphite or quartz, but the annular pre-heat ring does not appear to have a heating function or include a resistance heater. Thus, Chang does not teach the claimed silicon nitride compound coating, teaches against applying a coating of silicon nitride compound, and does not teach the resistance heater, or heater leads extending out of a ceramic block.

Furthermore, a teaching to a ceramic support provided with a protective coating, as shown in Chang, does not cure the deficiencies of Chen et al. because Chang teaches that a different coating comprising a diamond film provides the desired protective function. Chang also does not teach that a silicon nitride compound coating is desirable to reduce contaminants on a substrate support.

Nor does Berkman's teachings to a protective coating of silicon nitride over a ceramic die crucible do not cure the deficiency of the lack of disclosure in Chen et al. or Chang. The art of forming die crucibles is non-analogous to the art of substrate supports for substrate processing chambers, thus, one of ordinary skill in the art would not seek out literature for the fabrication of die crucibles to solve a contamination problem in a substrate processing chamber. Furthermore, Chen et al. provides no reason to seek coating art. Consequently, Berkman should not be used to cure the deficiencies of Chen et al. or Chang.

The Brown et al. teaches wear resistant thermal print heads with silicon-doped diamond-like carbon protective coatings that are used to print images in paper and related media. As amended, independent claim 11 is to a substrate support for a substrate processing chamber which is non-analogous art to thermal print head technology. Furthermore, the print head does not have a substrate receiving pocket that is sized to receive a substrate therein. One of ordinary skill in the art would not be motivated to use a coating used to reduce wear in a thermal print head to the art of reducing contamination from a pocket of a substrate support for a substrate processing chamber. Not only are the technical fields different, but the end application of reducing wear versus reducing contamination are also different. Thus, Brown et al., also does not cure the deficiency of Chen et al.

Todd generally teaches CVD synthesis of silicon nitride materials having low hydrogen content in microelectronics manufacture. However, Todd provides no teaching or motivation to apply a silicon nitride compound coating to a substrate support for a substrate processing chamber to reduce contamination of a substrate. A teaching to a method of fabricating a type of coating by CVD for fabrication of IC chips, is not a teaching that goes towards the obviousness of a substrate support component comprising a coating used to reduce contamination to hold a substrate. The reference provides no motivation or teaching that would cause one of ordinary skill in the art to apply the taught CVD method to the substrate support being claimed. Thus, Todd et al also does not teach or suggest the instant claims.

For these reasons, claims 1-5, 7, 8, 11-15 and 17 are not obvious over the cited combination of Chen et al. in view of Chang or Berkman et al., and Brown et al. or Todd. The Examiner is respectfully requested to reconsider this rejection.

II. Claims 6, 9 and 16 were rejected under 35 USC 103 (a) as being unpatentable over Chen in view of Chang or Beckman, and Brown or Todd as applied to claims 1-5, 7, 8, 11-15 and 17 above, and further in view of Burkhart et al. (US 6,469,283) or Tachikawa et al. (US 6,376,808).

The rejected claims 6, 9, and 16 are dependent upon parent claims 1 and 11. As explained above, the primary Chen et al. reference does not teach the claimed ceramic block of claim 1 with a ceramic coating comprising an amorphous Si-H-N-O compound, or the ceramic block of claim 11 with a silicon nitride compound coating.

Chang, also, makes no mention of the claimed amorphous Si-H-N-O compound or the claimed silicon nitride compound coating, and instead teaches a diamond film coating. By teaching a susceptor made of silicon nitride, Chang also teaches against use of a protective coating comprising silicon or nitrogen.

Berkman's teachings to a protective coating of silicon nitride over a ceramic die crucible do not cure the deficiency of the lack of disclosure in Chen et al. or Chang because forming die crucibles is non-analogous art to the fabrication of substrate supports for substrate processing chambers.

Brown et al. also teaches a non-analogous art that comprises the fabrication of wear resistant thermal print heads with silicon-doped diamond-like carbon protective coatings. One of ordinary skill in the art would not seek coatings used to reduce wear in a thermal print head to reduce contamination from a substrate support for substrate processing chamber.

Todd generally teaches CVD synthesis of silicon nitride materials having low hydrogen content in the manufacture of micro electronic devices. Todd provides no teaching or motivation to apply an amorphous protective coating comprising Si-H-N-O compound, or a silicon nitride compound coating, to a substrate support for substrate processing chamber to reduce contamination of the substrate placed on the chamber.

Burkhart et al. does not cure the deficiencies of the Chen in view of Chang or Beckman, and Brown or Todd, because Burkhart et al. makes no mention of a protective coating for the heater. Nor does Burkhart et al. teach or suggest the claimed ceramic coating comprising an amorphous Si-H-N-O compound or a silicon nitride compound coating on a ceramic block of a substrate support. Thus Burkhart et al. does not provide the motivation to combine the disclosed heater with a protective coating used in the manufacture of a thermal print head as taught by Brown et al., nor a micro electronic device as taught by Todd.

Tachikawa et al. does not cure the deficiencies of the Chen in view of Chang or Beckman, and Brown or Todd, because Tachikawa et al. teaches a heating apparatus having a heater and an electrode, but does not teach or suggest the claimed ceramic coating comprising an amorphous Si-H-N-O compound (claim 1), or a silicon nitride compound coating (Claim 11), on a ceramic block comprising a resistant heater as claimed. Nor does Tachikawa et al. teach any motivation to provide the ceramic coating comprising amorphous Si-H-N-O compound, or silicon nitride compound, on a heating apparatus. Thus, Tachikawa et al. does render the present claims obvious with respect to Chen et al. in view of Chang or Beckman, and Brown or Todd.

For these reasons, the Examiner is respectfully requested to reconsider the rejection of claims 6, 9 and 16.

III. Claims 10, 18-24 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Chen in view of Chang or Berkman, and Brown or Todd as applied to claims 1-5, 7, 8, 11-15 and 17 above, and further in view of Ishii (US 5,851,298) or Hwang (US 6,009,831).

Claim 10

Rejected claim 10 is dependent upon parent claim 1, which recites, inter alia, a substrate support comprising a ceramic block with a ceramic coating comprising an amorphous Si-H-N-O compound, a resistance heater in the ceramic block, and heater leads extending out of the ceramic block to conduct electrical power to the resistance heater.

Chen et al. does not teach the claimed ceramic block of claim 1 with a ceramic coating comprising an amorphous Si-H-N-O compound, or suggest the desirability of a coating. Chang also makes no mention of the claimed amorphous Si-H-N-O compound and instead teaches a diamond film coating. Berkman's teachings to a protective coating of silicon nitride over a ceramic die crucible do not cure the deficiency of the lack of disclosure in Chen et al. or Chang because forming die crucibles is non-analogous art to the fabrication of substrate supports for substrate processing chambers. Brown et al. teaches wear resistant thermal print heads with silicon-doped diamond-like carbon protective coatings, which is also non-analogous art to a substrate support for a substrate processing chamber. Todd generally teaches CVD synthesis of silicon nitride materials having low hydrogen content in the manufacture of micro electronic devices and provides no teaching or motivation to apply an amorphous protective coating comprising Si-H-N-O compound to a substrate support for substrate processing chamber.

Ishii teaches teaches a heating apparatus having a heater and an electrode, however, Ishii does not teach or suggest the claimed ceramic coating comprising an amorphous Si-H-N-O compound. Hwang teaches a heating apparatus

having a heater and an electrode; however, Hwang also does not teach or suggest the claimed ceramic coating comprising an amorphous Si-H-N-O compound.

Thus, the cited rejection of claim 10 based on Chen in view of Chang or Berkman, and Brown or Todd as applied to claims 1-5, 7, 8, 11-15 and 17, and further in view of Ishii or Hwang, should be reconsidered.

Claims 18-24

Claim 18 is to a substrate support for a substrate processing chamber, the substrate support comprising a block comprising a first ceramic and which has a substrate receiving pocket sized to receive a substrate, a peripheral ledge extending about the substrate receiving pocket, and side surfaces. A coating comprising a second ceramic that is a different ceramic than the first ceramic covers the substrate pocket and peripheral ledge. The second ceramic comprises an amorphous Si-H-N-O compound or silicon nitride compound. A resistance heater and gas energizer electrode are in the block, and electrode leads extend out of the block to conduct power to the resistance heater and gas energizer electrode.

Chen et al. teaches a multi-zone resistance heater, but does not teach a support comprising a block comprising a first ceramic and having a coating comprising a second ceramic that is a different ceramic than the first ceramic, the second coating comprising an amorphous Si-H-N-O compound or a silicon nitride compound. Chen et al. provides no teaching to the desirability of a coating. Nor does Chen et al. teach a ceramic block composed of a first ceramic with a second ceramic coating. As acknowledged by the Examiner, Chen et al. also does not teach a second ceramic comprising an amorphous Si-H-N-O compound or a silicon nitride compound coating to reduce contamination arising from the first ceramic. In fact, Chen et al. provides no teaching a suggestion that a coating is desirable on the multi-zone heater.

Chang does not support the deficiencies of Chen et al. because Chang also does not disclose a ceramic block comprising a first coating, and having a second coating comprising an amorphous Si-H-N-O or silicon nitride compound. Chang discloses a diamond coating on the body of a susceptor. Chang further teaches that the susceptor body can be made of silicon nitride. By teaching that the susceptor itself is made from silicon nitride, Chang teaches against a ceramic block having a ceramic coating comprising amorphous Si-H-N-O compound or silicon nitride compound as claimed.

Furthermore, Chang does not teach a ceramic block that includes the resistance heater or heater leads extending out of the ceramic block to conduct electrical power to the resistance heater. Chang mentions an annular pre-heat ring made of silicon carbide coated with graphite or quartz, but the annular pre-heat ring does not appear to have a heating function or include a resistance heater. Thus, Chang does not teach the claimed silicon nitride compound coating, teaches against the claimed coating, and does not teach the resistance heater, or heater leads extending out of a ceramic block.

Nor does Berkman's teachings to a protective coating of silicon nitride over a ceramic die crucible cure the deficiency of the lack of disclosure in Chen et al. or Chang. The art of forming die crucibles is non-analogous to the art of substrate supports for substrate processing chambers, thus, one of ordinary skill in the art would not seek out literature for the fabrication of die crucibles to cure a contamination problem in a substrate processing chamber.

The Brown et al. teaches wear resistant thermal print heads with silicon-doped diamond-like carbon protective coatings that are used to print images in paper and related media. Thermal print head technology is non-analogous art to the claimed substrate support for a substrate processing chamber.

Todd generally teaches CVD synthesis of silicon nitride materials

containing a low hydrogen content in microelectronics manufacture. However, Todd provides no teaching or motivation to apply a silicon nitride compound coating to a substrate support for a substrate processing chamber to reduce contamination of the substrate placed on the support in the chamber. Thus, Todd et al also does not teach or suggest the instant claims.

Ishii teaches teaches a heating apparatus having a heater and an electrode, however, Ishii does not teach or suggest the claimed substrate support comprising a block of a first ceramic with a coating of the second ceramic that is a different ceramic and that comprises amorphous Si-H-N-O compound or silicon nitride compound.

Hwang teaches a heating apparatus having a heater and an electrode; however, Hwang also does not teach or suggest the claimed substrate support comprising a block of a first ceramic with a coating of the second ceramic that is a different ceramic and that comprises amorphous Si-H-N-O compound or silicon nitride compound.

For these reasons, claims 18 to 24 are not obvious over the cited combination of Chen et al. in view of Chang or Berkman et al., and Brown et al. or Todd and further in view of Ishii or Hwang. Thus, the Examiner is respectfully requested to reconsider this rejection.

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CONCLUSION

The above-discussed amendments are believed to place the present application in condition for allowance. Should the Examiner have any questions regarding the above remarks, the Examiner is requested to telephone Applicant's representative at the number listed below.

Respectfully submitted,
JANAH & ASSOCIATES, P.C.

Date: March 22, 2005

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